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ABSTRACT

This module on the skeletal system is one of eight modules designed for individualized instruction in health occupations education programs at both the secondary and postsecondary levels. This module contains an introduction to the module topic, two objectives (e.g., list the types of joints and movements, and give examples), and two learning experiences. Each learning experience contains an overview, an activity (reading a module information sheet), and a student self-check with model answers. Concluding the module is a student self-assessment form (three essay questions) and a student performance assessment form to be completed by the instructor. (JH)

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HEALTH OCCUPATIONS

MODULE

THE SKELETAL SYSTEM - II

DEPARTMENT OF VOCATIONAL EDUCATION

Temple University

of the Commonwealth System of Higher Education

Philadelphia, Pennsylvania

January, 1978

CE 022 538

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HEALTH OCCUPATIONS

MODULE

For the teacher...

ABOUT THE MODULE

DEPARTMENT OF VOCATIONAL EDUCATION

Temple University
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Philadelphia, Pennsylvania

- CE 022 538 -

January, 1977

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For the teacher...

ABOUT THE MODULE

ORGANIZATION

Each module is designed to help the student to gain competence in an area considered important in health occupations.

Each module contains an introduction and a series of learning experiences. Overviews, which precede each learning experience except the final one, provide at a glance brief descriptions of what each learning experience entails.

Two types of objectives form the basis of the learning experiences: a terminal objective and enabling objectives. The enabling objectives are designed to help the student achieve the terminal objective. Each learning experience has activities designed to facilitate accomplishing the objectives, and by use of the feedback devices provided, the student should be able to determine if he/she has reached each objective.

The first learning experience is designed to provide the needed background information. The remaining learning experiences are designed to provide the opportunity to apply that information in a practice situation. The final learning experience always requires the demonstration of the skill in an actual school situation.

PROCEDURE

1) Briefly discuss the purpose of the module.

2) Direct the students to review the introduction, the objectives and overviews preceding each learning experience, including the final learning experience.

3) The student needs to complete only those modules and/or learning experiences covering skills he/she does not already possess.

4) Answer the questions related to the module.

5) If the student decides that he/she is already competent in the specified area, provide him/her with an opportunity to "test out." Administer the "Final Learning Experience."

6) Instruct students who do not have the competencies indicated, to complete the module.

7) In cooperation with the student, determine a schedule for completing the module.

8) Instruct the student to make the necessary arrangements with you, the resource person, when he/she is ready to take the final learning experience.

9) If the student is unsuccessful in completing the final experience, instruct him/her to meet with you, the resource person, in order to provide for recycling through the module, or for completing some other activity suggested by the student or resource person and commonly agreed upon.

TERMINOLOGY

Actual School Situation -- refers to a situation in which one is actually a student in a real school.

Occupational Specialty Area -- refers to the student's major area of emphasis within the health occupations program.

Peers -- refers to fellow students who are used to:
1) role-play students, etc.,
2) critique the student's performance, and
3) participate in discussions.

Unless otherwise specified, these peers should be persons within the student's own occupational specialty.

Resource Person, Instructor -- refers to the person in charge of the student's educational program, i.e., the teacher who is guiding the student in taking the module.

You, Student -- refers to the person who is taking the module.

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RESOURCES

This module is intended as a guide for your study of the skeletal system. You are free to explore other resources on your own initiative.

Objectives

Terminal Objective

Demonstrate competence in the knowledge of the skeletal system.

Enabling Objectives

1. Describe bone markings and their significance.
2. Identify the types of joints, their movements, and give examples.

Learning Experience I

Overview

Enabling Objective	Describe bone markings and their significance.
Activity 1	Read the information sheet on "Bone Markings and their Significance."
Activity 2	Complete the "Self Check."
Feedback	Compare your completed "Self Check" with the "Model Answers."

(Activity 1)

Bone Markings and Their Significance

There is a useful system for bone markings which relates to openings, hollows or depressions, and projections or processes. Each such marking has a purpose. A few of these are important to know, as they are used for reference points.

Openings and Depressions:

1. A foramen is a hole or opening for passage of blood vessels, nerves and ligaments.
   example: The foramen magnum of the occipital bone is the opening which permits passage of the spinal cord to the brain.
2. A meatus is a long, tube-like canal or passageway.
   example: The external ear canal (auditory meatus) in the temporal bone serves as a passageway to the middle ear.
3. A sinus is a cavity or sponge-like space in bones which is lined with mucous membrane.
   example: the paranasal sinuses are found in the sphenoid, ethmoid, frontal and maxillary bones. These sinuses lighten the bones of the skull and give resonance to the voice. They drain into the nose.
   Mastoid sinuses, which are found in the mastoid process of the temporal bones, drain into the middle ear.
4. A fossa -- a depression or hollow, usually to accommodate some other nearby structure.
   example: The acetabulum is a depression in the pelvic bone which articulates with the head of the femur. The glenoid cavity is a depression in the scapula which articulates with the head of the humerus.

Processess and Projections:

1. The head of a bone is a rounded projection beyond the narrow neck-like portion of a long bone.
   example: The head of the femur, which articulates with the acetabulum. The head of the humerus, which articulates with the glenoid cavity.
2. A condyle is a rounded projection or knot at the end of a bone. It helps make a joint.
   example: The small projection on the mandibular bone, which articulates with the temporal

bone to form the mandibular joint.

3. A process is small rounded bone projection.
   example: The acromion process of the scapula is used as a reference point for injections in the deltoid muscle.

4. A tuberosity is a large, roughened projection on a bone.
   example: The ischial tuberosities are the large projections of the ischium (dorsal part of the pelvic bone) on which one sits.

5. A trochanter is a very large process on a bone.
   example: The greater trochanter of the femur is a large process or projection near the upper end of the femur.

6. A spinous process or spine is a pointed slender projection on a bone.
   example: Locate these on the lumbar vertebrae.

7. A crest is a narrow edge or ridge on a bone.
   example: The iliac crest is occasionally used for removal of a bone marrow sample.

Self Check

1. The opening in the occipital bone through which the spinal cord travels to the brain is the
   ____ a) mental foramen
   ____ b) foramen magnum
   ____ c) vertebral foramen
   ____ d) infra-orbital foramen

2. The bone with which the humerus articulates is the
   ____ a) clavicle
   ____ b) scapula
   ____ c) ilium
   ____ d) ischium

3. The external ear canal which passes to the middle ear is known as a _____.

4. The knob at the end of a bone which helps form a joint is a
   ____ a) process
   ____ b) head
   ____ c) condyle
   ____ d) fossa

5. The lumbar vertebrae have slender, pointed projections called
   ____ a) sinuses
   ____ b) crests
   ____ c) spines
   ____ d) tuberosities

6. The projection on the dorsal part of the pelvic bone on which one sits is known as the ischial
   ____ a) process
   ____ b) trochanter
   ____ c) condyle
   ____ d) tuberosity

7. Beyond the narrow, neck-like portion of the femur is a rounded projection called the
   ____ a) condyle
   ____ b) process
   ____ c) head
   ____ d) sinus

8. The sponge-like spaces found in our head which are lined with mucous membranes which become inflamed when we have "colds" are called _____ _____.

Feedback: Model Answers

1. The opening in the occipital bone through which the spinal cord travels to the brain is the (b) foramen magnum.

2. The bone with which the humerus articulates is the (b) scapula.

3. The external ear canal which passes to the middle ear is known as a meatus.

4. The knob at the end of a bone which helps form a joint is a (c) condyle.

5. The lumbar vertebrae have slender, pointed projections called (c) spines.

6. The projection on the dorsal part of the pelvic bone on which one sits is known as the ischial tuberosity.

7. Beyond the narrow, neck-like portion of the femur is a rounded projection called the head.

8. The sponge-like spaces found in the head, lined with mucous membranes which become inflamed when we have "colds" are called sinuses.

Learning Experience II

Overview

Enabling Objective	Identify the types of joints, their movements, and give examples.
Activity 1	Read the information sheet on "Joints."
Activity 2	Complete the "Self Check."
Feedback	Compare your completed "Self Check" with the "Model Answers."

(Activity 1)

Joints

A joint is a point of connection or articulation between bones. Where they are joined together, the shape of one bone fits the shape of the other one. In some joints bones are separated by cushions or by smooth, slick membranes which allow for movement. In other joints bones are held firmly together with tough, immovable fibers. The kind of tissue separating bones or binding them together depends on the function of a joint. Some need to be freely movable, and others must be fixed in position. A ligament is a strong, flexible, band of fibrous, connective tissue which helps hold bones together in the joints.

Types of Joints:

There are three types of joints, and they are classified according to the amount of movement they allow. The three types of joints are immovable, slightly movable, and freely movable.

1. A synarthrosis is an immovable joint with no joint cavity. example: The flat bones of the skull are interlocked by the jagged edges of their sutures. No movement is possible between these bones.

2. The amphiarthrosis is a slightly movable joint, because the bones involved are separated by cartilage. example: The place where the two hip bones meet (the pubic symphysis.) The vertebrae are also slightly movable joints.

3. The diarthrosis (also called synovial joints) are freely movable joints. These joints are characterized by having a cavity between the ends of the bones which holds fluid (synovial fluid). This fluid helps prevent friction between the ends of the bones. There are several different kinds of synovial joints.

   a. Hinge joints -- The elbow is an example of a hinge joint. It permits a back and forth movement and has the ability of great power because there is little danger of twisting.

   b. Pivot joints -- Rotation of the head from side to side is an example of a pivot joint movement. Rotation is the only movement permitted by these joints.

   c. Ball and socket joint -- permits movement in most directions. These joints are formed by the rounded end of one bone fitting into the cup-like socket of its neighbor. Examples include the shoulder and hip joints.

Types of Movement in Joints:

1. Flexion -- is a bending movement, as when the forearm bends at the elbow to bring it closer to the

upper arm.

2. Extension -- is a straightening of a joint, as when the forearm is straight with the upper arm.

3. Abduction -- is a movement away from the midline. In the fingers and toes it is the movement away from the third finger and the second toe. It is the movement of the leg or arm away from the body.

4. Adduction -- is the movement toward the midline of the body, as when the arm is returned toward the body.

5. Rotation -- is a twisting, pivoting or revolving, as when the head is turned in one direction and then another.

6. Supination -- is the position in which the palm of the hand is turned toward the body and the limb is slowly twisted so that the palm is out of view.

7. Pronation -- the position in which the palm of the hand is turned away from the face, and then the limb is slowly twisted so that the palm is seen.

(Activity 2)

Self Check

1. Name the three types of joints found in the body.

   1) _____
   2) _____
   3) _____

2. What is the function of the synovial cavity and the synovial fluid in a joint?

   _____

3. An example of an amphiarthrosis joint is

   ____ a) a suture of the skull
   ____ b) the pubic symphysis
   ____ c) the vertebrae
   ____ d) the elbow

4. Movement of the leg away from the side of the body is

   ____ a) flexion
   ____ b) extension
   ____ c) abduction
   ____ d) adduction

5. A swinging movement at a ball-and-socket joint may be called

   _____

6. Rotational motion opposite to supination is _____.

7. A _____ is a strong, flexible bond of fibrous connective tissue which helps hold bones together in the joints.

8. The elbow is an example of a

   ____ a) hinge joint
   ____ b) pivot joint
   ____ c) ball-and-socket joint

9. A bending movement, as when the forearm bends at the elbow, is an example of

   ____ a) adduction
   ____ b) abduction
   ____ c) flexion
   ____ d) extension

10. The straightening of a joint is an example of

____ a) flexion
____ b) extension
____ c) supination
____ d) pronation

Feedback: Model Answers

1. The three types of joints found in the body are

   1) synarthrosis
   2) amphiarthrosis
   3) diarthrosis

2. The function of the synovial cavity and the synovial fluid in a joint is to prevent friction.

3. An example of an amphiarthrosis joint is (c) the vertebrae.

4. Movement of the leg away from the side of the body is (c) abduction.

5. A swinging movement at a ball-and-socket joint may be called rotation.

6. Rotational motion opposite to supination is pronation.

7. A ligament is a strong, flexible bond of fibrous connective tissue which helps hold bones together in the joints.

8. The elbow is an example of a (a) hinge joint.

9. A bending movement, as when the forearm bends at the elbow, is an example of (c) flexion.

10. The straightening of a joint is an example of (b) extension.

FINAL EXPERIENCE

Student Self-Assessment Form

1. Briefly discuss bone markings and their significance.

2. Describe bone joints and movements.

3. You have no doubt compared the information in your two brief essays above with the information sheets contained in this module. Based on this comparison, how well do you know the skeletal system? What resources other than this module have you used in your study of this topic? Discuss the skeletal system freely with your fellow students and your resource person.

STUDENT PERFORMANCE ASSESSMENT FORM

	Level of Performance	
	Satisfactory	Unsatisfactory
Bone Markings and their Significance		
Openings and Depressions:		
1. Foramen		
Definition		
Function		
Example.		
2. Meatus		
Definition		
Function		
Example.		
3. Sinus		
Definition		
Function		
Example.		
4. Fossa		
Definition		
Function		
Example.		
Processes and Projections:		
1. Head		
Definition		
Function		
Example.		
2. Condyle		
Definition		
Function		
Example.		
3. Process		
Definition		
Function		
Example.		
4. Tuberosity		
Definition		
Function		
Example.		

	Satisfactory	Unsatisfactory
5. Trochanter		
Definition		
Function		
Example.		
6. Spine		
Definition		
Function		
Example.		
7. Crest		
Definition		
Function		
Example.		
Joints		
Types:		
1. Synarthrosis		
Definition		
Example.		
2. Amphiarthrosis		
Definition		
Example.		
3. Diarthrosis		
Other name		
Definition		
Three types of such joints		
a) Name.		
Type of Movement. . . .		
Example		
b) Name.		
Type of Movement. . . .		
Example		
c) Name.		
Type of Movement. . . .		
Example		
Types of Movement in Joints:		
1. Flexion		
Definition		
Example.		
2. Extension		
Definition		
Example.		

	Satisfactory	Unsatisfactory
3. Abduction		
Definition		
Example.		
4. Adduction		
Definition		
Example.		
5. Rotation		
Definition		
Example.		
6. Supination		
Definition		
Example.		
7. Pronation		
Definition		
Example.		